NASA TECHNICAL MEMORNADUM

NASA TM-77997

X-RAY SATELLITE STATUS REPORT-THIRD QUARTER 1985

Deutsche Forschungs- und Versuchsanstalt fuer
Luft- und Raumfahrt (DFVLR)

(NASA-TM-77997) X-RAY SATELLITE Status Report, third quarter 1985 (National Aeronautics and Space Administration) 49 p
HC A03/MF A01 CSCL 22B G3/18 N86-17370 Unclas 05325

Translation of "Roentgen Satellit Statusbericht; 3. Quartal 1985", Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt - DFVLR (German Aerospace Research Establishment), Cologne West Germany, Report no. WF2/9143, September 30, 1985, pp. 1-72

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
WASHINGTON, D.C. 20546 NOVEMBER 1985

STANDARD TITLE PAGE

1 Report No.	2 Government Accession No.	3 Recipient's Catalog No.
NASA TM-77997		

4. Title and Subtitle	5. Report Date
X-RAY SATELLITE STATUS REPORT - THIRD QUARTER 1985	December 1985
	6. Performing Organization Code
7. Author(s)	8. Performing Organization Report No.
Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt - DFVLR (German Aerospace Research Establishment)	10. Work Unit No.
	11. Contract or Grant No. NASW-4006
9. Performing Organization Name and Address The Corporate Word, Inc. 1102 Arrott Bldg. Pittsburgh, PA 15222	13. Type of Report and Period Covered Translation
12 Sponsoring Agency Name and Address National Aeronautics and Space Administration Washington, DC 20546	14. Sponsoring Agency Code

15. Supplementary Notes Translation of "Roentgen Satellit Statusbericht; 3. Quartal 1985", Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt DFVLR (German Aerospace Research Establishment), Cologne West Germany, Report No. WE2/9143, September 30, 1985, pp. 1-72

16. Abstract The 3rd Quarter Status Report on DFVLR's ROSAT project confirms that with regard to technical performance and costs the project is on schedule. The valid schedule for engineering model and flight model completion on May 7, 1985 leads to a launch date on October 30, 1987. Progress in each department is compared to and explained with regard to the milestone plan. Continued problems with the gold damping of the FM-mirror system and contamination of the sterile rooms where the mirrors are stored have led to postponement of milestone 7. - It is not yet completely clear to what extent all successive milestones will be affected by this factor.

ORIGINAL PAGE IS
OF POOR QUALITY

17. Key Words (Selected by Author(s))	18. Distribution Statement
	Unlimited

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
Unclassified	Unclassified	49	

TABLE OF CONTENTS

PRECEDING PAGE BLANK NOT FILMED

10.0 Mission Operation

11.0 Schedule

12.0 Administrative Report (Special distribution)

13.0 Appendix
13.1 Personnel Utilization
13.2 Key to Abbreviations

STATUS REPORT

1.0 Survey and Outlook /3*

1.1 Status of Projects

Summary

With regard to technical performance and costs, the project is running according to plan. The valid schedule for EM- and FM- completion on May 7, 1985, leads to a launch date on October 30, 1987. This corresponds to the contract milestone plan and, taking the four-week buffer into consideration, meets with the launch date of September 9, 1987, agreed upon in the Payload Integration Plan.

Due to problems with the gold damping of the FM-mirror system, we must reckon with a postponement of milestone M7. It is not yet completely clear to what extent all successive milestones will be affected by this factor.

Documentation

Project Plan:

The project plan has not yet been presented to the DFVLR board because of reservations regarding the data processing design to be used during the mission.

Specification documents:

Another reworked version of the interface specification for

---

*Numbers in margin indicate pagination in the foreign text.

the WFC--Issue 3, Revision A--dated June 6, 1985--was put into effect.

Development and Production /4

Production of FM-instruments is to be continued as planned.

Test and Integration

The FI-EM infeed for EM-integration is completed. EM-integration corresponds to planning status of May 5, 1985. The Modal Survey Test and Suitcase Test were completed at NASA-JSC.

Review

The Phase 2 Safety Review for flight and ground operations was completed successfully at NASA.

The tenth status review by the chief contractor was carried out in September.

Milestones

Milestone M4 in which ROSAT is ready for Modal Survey Test was reached on schedule.

Problems /5

The schedule cannot be changed. Should the IABG plant become unavailable for the STM solar simulation test, it would be necessary to use a facility outside Europe to keep on schedule. Cost increases in the area of focal instrumentation exceed the average estimates for the payload in the project plan.

1.2 Outlook

Exact determination of the postponement of milestone M7 and the effects on the successive ones (M8-M11) are being investigated in connection with a rescheduling of the FM-integration. The effects of the announced delays for the FI-FM and the WFC-FM must be reviewed.

The Integrated System Test (IST) and the EMC Test for conducted noise will be carried out in connection with the EM-integration schedule.

When milestone M5 has been reached, verification of EM-objectives will be reviewed separately from the design review (DR 2) by the DFVLR project directors for the chief contractor. The DR 2 is planned for the first quarter of 1986.

1.3 Survey of Problems /6

Area	Type of Problem
1. Management	- At present, no problems with chief contractor.
2. System	- Agreement with NASA on HRI random test loads has not been reached. Failure of high vacuum in the HRI-detector on the attached ion pump needs to be clarified and eliminated.* Time delays in FI-FM completion require clarification and determination of auxiliary measures.*
3. Mechanical Subsystems	At present, no problems.

4.	Electric Subsystems	Failure of the oven-stabilized quartz in the data processing system needs to be clarified to guarantee that sufficient operating safety exists for the FM on the "Single-Point-Failure" position. Exceeding the temperature limits on the solar generator on the open loading bay in the Shuttle and during direct contact with the sun's radiation can be prevented by altering Shuttle orientation in the PIP.*
5.	Telescope	The light scattering requirements of the star sensor on the AKS-system cannot be satisfied and need to be discussed. /7 Assembly of the FM-mirror system has been interrupted due to irregularities in the gold damping of paraboloids P3 and P4.
6.	Assembly, Integration Test	Suitcase test date for JSC overlaps with EM-AIT planning by about one week.** The possibility that the IABG test chamber for the solar simulation test may not be available when needed would necessitate costly replacement measures.
7.	Ground Equipment	At present, no problems.

8.	Mission Safety	Dragging construction part delivery from MBB.**
9.	Launch Vehicle Interface	At present, no problems.
10.	Mission Operation	Mission operation and simulator development /8 suffer from understaffing. The data processing concept remains open.
11.	Schedule	Postponements are anticipated in the data transmission and building parts acquisition subsystems. Due to problems with the gold damping of the FM-mirror system, we must reckon with a postponement of milestone M7. It is not yet completely clear, to what extent all successive milestones will be affected by this factor.

(*Items 2b, 2c, and 4b are problems recently under consideration. **Items 6a and 8 have been resolved.)

2.0 System /9

System Budgets

The system budget for energy expenditure and mass, as well as for the telemetry and command lists were continued. All budgets still indicate a level sufficiently below specified boundaries.

Reevaluation of the budget for site measuring precision for the whole system was begun after the process for error addition could be agreed upon and essentially clarified.

Chemical Purity

During the report period, contamination appeared on the FM-mirrors in the sterile room at C. Zeiss. Details of investigations on the causes and measures to eliminate possible causes are given in section 5.

Based on experience gained from the mirror system, the sanitary procedures for the DS sterile room were revamped.

At present, investigations are underway to determine to what extent measures to prevent contamination during launch site activities must be expanded.

3.0 Mechanical Subsystems /10

3.1 Structure/Mechanisms

The structure was delivered to DS on schedule on July 5, 1985 by MBB.

Since the dynamic analysis of the ROSAT was carried out using a total weight of 2,800 kg, a new diagonal mass matrix had to be used for the existing Modal Survey Test, since the real ROSAT weight presently amounts to 2,460 kg.

The structure was subjected to the Modal Survey Test at DS. Manual estimations and temporary test evaluations agreed well with dynamic analysis. Only the final evaluation of test results will determine if ROSAT will have to adapted to the mathematical FEM (Finite Element Model).

The "as built status" of the STM could be presented and also the analyses related to mass characteristics.

The three qualification models (QM) of the telescope mechanism--antenna boom and separation switch--(TDM, ABM, SSM) were delivered to AIT. The ADP's on these mechanisms were also presented.

Flight model production was begun for the TDM. Integration is to be completed in October, 1985.

The FM drawings for the ABM and SSM were nearly complete and will be available at the beginning of October.

The roller leaves of the SSM were altered so that /11
rolls can be secured onto the compression spring with two screws, rather than as indicated before.

3.2 Thermal Budget

MLI-production was continued as planned. The first mission analysis was reworked. Results from the orbiter/ROSAT thermal analyses for open door situations showed that the solar generator in the lower range (-z) became too hot when the shuttle bay was aligned with the sun for 30 minutes. The temperatures of the CSS I and III also exceeded permissible values. This was caused by hollow spaces occurring due to ROSAT's position, and these spaces absorbing incoming sunrays via multiple reflection, even though the surfaces are predominantly white.

To solve the problem, talks with NASA have resulted in reduction of the maximum time (from 30 minutes previously, to 15 minutes now) the bay may be exposed to the sun with this time recorded in the PIP. This allows all the endangered components to remain within the permissible temperature range.

Preparations to carry out the solar simulation test have begun. A description of the test was presented.

4.0 Electric Subsystems /12

4.1 and 4.2 Energy Source, Pyrotechnics

A status discussion was held on September 17, 1985, at DS to review production status, FM-component schedule, and processing status of documentation of both subsystems.

Production status for FM hardware is as follows:

Solar generator:

Design update is completed.

Preparatory work on the panel coating was begun. In the process it was noted that the panel structures are not smooth as is normally the case, but rather that their surface has a wrapped structure. According to AEG, this is necessary to verify adhesive binding using additional sample tests (between approximately 1,000 - 10,000 temperature cycles). These tests will be carried out beginning October 1985, and it was guaranteed that test results would be available and evaluated before the start of the actual panel coating (planned start: December 1, 1985).

Electronic boxes (PDU, PCU, BCU, Shunt, Pyro):

The mechanical parts of the electronic boxes are being prepared.

Cabling of the shunts has been started.

Battery (FM) /13

Dornier carried out compulsory inspection ("MIP") of the FM-battery cells before the cells were capped at SAFT. Results of this inspection are not yet available.

Battery (EM)

During the report period, qualification tests on the EM-battery were conducted successfully. The test report has been written but not yet delivered to the DFVLR for evaluation.

The status of subsystem documentation is as follows:

FM-production is being carried out on the basis of specifications which have already been revised and which will be presented to the DFVLR as of October, 1985 for evaluation.

The contractor has guaranteed that there have been no changes in the specifications which would have required a detailed consultation or else agreement by the project directors before inclusion thereof.

With regard to NCR's and MRB's test and integration regulations, there are no unresolved points which interfere with the planned progression of the EM-integration and the FM-production.

Scheduling, Problems /14

A review of scheduling (as of August 30, 1985) for FM-component production showed that all FM-components are included in the scheduling. This report took into

consideration the situation (as of September 12, 1985) with delivery of HIREL construction parts.

HIREL construction parts are essentially available. The delivery date for the remaining construction parts (such as Relay M300 and M502) are, in accordance with the "CPP Delay" list of July 27, 1985, acceptable for FM-production.

Delivery (entrance DS) of the STM solar generator for STM/EM-integration took place on August 9, 1985.

No technical problems occurred during FM-electronic box production.

4.3 Wiring /15

As with the subsystems comprising energy sources and pyrotechnics, status discussions were held at DS for this subsystem on September 17, 1985.

The status of FM-cabling network production is as follows:

The power and pyrocable network is laid in the auxiliary structure for cable network production.

The signal cable network will go into production shortly in the placements.

The telescope cable network is laid; plugs are attached on one side.

The STS-heater cable network has not been laid yet. The STS-cable network will be installed as soon as the signal cable network is finished.

The status of subsystem documentation is as follows:

Production on the FM-harness list will begin soon.

The cabling list for the STS-heater cable system has been prepared.

Scheduling, Problems /16

Projects on the FM cable system are on schedule (as of August 30, 1985). The contractor agreed to include STS-heater cable system production in the scheduling.

Short-term problems with deliveries from Raychem-Kabel, such as occurred at the beginning of the report period, have been resolved and have no effect on FM-production.

4.4 Data Processing /17

The DHS was delivered to the system shortly before the start of this report period. During integration in the ROSAT-EM, some mistakes on the DHM or else on its exterior interface were detected. However all of these were within normal, i.e., expected, limits. The mistakes were eliminated without problem immediately after concluding integration activities.

Upon completing the radiation EMC qualification test, which had been delayed, the DHS was available on shedule for the planned compatibility test at JSC.

Due to the problems which arose on the oven-stabilized quartz in the on-board clock, the current concept of this single-point-failure component had to be reevaluated: For reasons of reliability, DS suggests this oscillator be designed for the FM-model.

FM-component construction was started along with these EM-activities. The original concept of checking the planned construction part exchange using SOS parts on the EM can no longer be maintained due to late deliveries. As such, disturbance-free use of SOS construction parts can first be checked on the FM.

4.5 Data Transmission /18

A test set was assembled for the interface tests at NASA-JSC to determine the data recording system's compatibility with the Shuttle. This test set consisted of a transponder (FM), the decoder function model, the data processing system's EM, transponder test instruments, and several special instruments. Test regulations were set by NASA.

Execution of the test at the end of September at NASA-JSC determined that the ROSAT data recording system is completely compatible with Shuttle requirements.

Transponder

One transponder was employed in each case for the interface tests on the whole system and in the test set. To date, no deviations from specified behavior have been detected.

Decoder

The EM was integrated into the satellite (EM/STM). There were no notable difficulties during the interface test on the whole system. Production on conductor plates and housing for the FM was started.

Antenna

The EM was delivered. Flight model production was started.

4.6 Attitude measurement and control /19

Star Sensor

After the TV test, leakages and image errors caused by poor focusing were determined in the EM of the STC. As a result of this, the STC was returned to SIRA on July 17, 1985.

Gyroscope

Conduction plate production for the FM was started. The EMC test report has been prepared.

AMCE

EMC tests were conducted, and test reports prepared.

Reaction Wheels

Magnetic parts such as reactors and transformers for the FM were prepared.

Star Catalog

A re-worked version of the star catalog is available. Documentation for it is being prepared.

Software

Preliminary statistical and dynamic tests on software parts were conducted (standby-, checkout-, and safe-mode). Software development for normal and degraded mode are to be completed by the end of December 1985.

Problems /20

The EM-subsystem cannot be completely delivered to the IST. Remaining software will be developed using the star sensor prototype. Delivery difficulties with construction parts could possibly influence the star sensor FM date.

5.0 Payload /21

5.1 X-Ray Telescope

5.1.1 Telescope QM and FM

During assembly of the telescope QM following the vibration qualification test, the components were measured optically. No significant changes were determined compared to conditions before the test. Thus, the telescope successfully passed vibration qualification. The test report has not been filed.

The telescope QM was remounted, equipped with thermal hardware, and readied for installation into the spacecraft-STM together with the integrated FI-EM on August 15, 1985.

Production on the CFK-barrels of the telescope flight model's optical bank began during the report period. In spite of a several-month delay in production startup, the date of delivery to the telescope assembly is not in danger.

5.1.2 Mirror System

The projects on the flight mirror system have been stalled substantially. One reason for this is the problem with the gold damping of flight mirrors P4F and P3F, described in the last report. To test the effects of the spots in the gold coating, it was necessary to delay starting the flight mirror system

assembly. The measures which have been worked out are currently being tested in the repairs on P4F.

Unfortunately, it was necessary to scrap a check on /23 whether P4F and P3F can be used X-ray optically in spite of the small spots on less the 0.5% of the entire surface. At the end of July, 1985 a substantial contamination on the gold coatings was discovered during a control of the the test mirrors coming from the sterile room at C. Zeiss. The quartz micro-vehicles (QCMs) applied together with on-going environmental tests had failed and provided no proof of contamination. Flight mirrors P4F and P3F, stored in the sterile room, were likewise contaminated, making an X-ray test meaningless.

The renewed contamination in the sterile room at C. Zeiss leads to a further delay in production of the flight mirror system. The expectation, based on measures taken after discovering the contamination during verification model production, that the causes were eliminated and controls improved, proved unfounded. For this reason, a renewed thorough investigation to determine and eliminate the contamination sources was introduced. This resulted to a large extent in oils being banned from the sterile room, as well as carbohydrates in the sterile room air being eliminated by changing the air ducts and improving filtering. The necessary precautionary changes and resulting verification of the room's sterility led to flight mirror system assembly being delayed until January 1986. This means a 7-month delay in the delivery date.

Repairs to the sterile room at C. Zeiss determine the critical course of the flight mirror system and with it of the telescope-AIT-program. The contamination has caused DS to reevaluate contamination risks during the AIT-program.

Plans are being made to separate the telescope program /23 from the spacecraft-Bus-program. This would likewise assist largely in eliminating delays with the flight mirror system. Additional time would be saved by reevaluating the necessity of tests. Plans exist to rework the flight model-AIT-program by the end of the year.

The status of projects in the contract (separate from those for the entire system) on production of the individual flight model mirrors at C. Zeiss is as follows:

With the exception of the concluding X-ray optical test of H1F and H2F, as well as cutting the P1F, H1F, P2F, and H2F to length, work is completed. The projects have been delayed temporarily in connection with repair measures for gold spots and contamination.

5.1.3 Focal Plane Instrumentation

The FI-EGSE and FI-EM were input on schedule. Acceptance tests and electrical and mechanical integration into the spacecraft were conducted successfully.

Production of FI-flight model components were continued during the report period.

Unresolved problems were considered further: /24

HRI-Random Vibration Loads

Based on telescope vibration test results, DS reevaluated HRI-testloads. Because of unexpectedly high telescope resonances in the range around 150 Hz, no reduction resulted, but rather an increase of HRI loads. In discussions with DS and GSFC it became clear, however, that DA had made very conservative estimates of load calculations. For this reason,

it was agreed that GSFC should derive realistic HRI random loads using available test data on the basis of joint ROSAT/STS analyses. The results of this calculation are to be determined with the DFVLR-PL, before the HRI is tested.

FI-FM-Delays

Due to a three-month delay FI-mechanical component production delay at MBB (under contract with MPE) and difficulties in procuring electronic components (ADC's, peak detectors), the FI-FM-delays have become more critical. In addition to this, design changes are necessary on the flight PSPCs to guarantee proper functioning during the mission. These changes and additional tests likewise influence the FI-FM-schedule. The exact extent of the delays is presently being worked out at MPE.

The effects of the delays on the overall ROSAT-shedule remains open. It is planned to contain the delays by restructuring the FM-AIT-plan.

Vacuum Loss in the HRI-EM

Following integration of the FI-EM into the telescope and into the spacecraft it was determined that the vacuum in the HRI-EM collapsed. The HRI-EM is to be repaired following its completion at the beginning of October, 1985.

5.2 Wide Field Camera /25

The 0-level document "Spacecraft/XUV Wide Field Camera, Interface Requirements" was reworked, and Issue 3--Revision A from June 7, 1985, was signed into power by the DFVLR on September 13.

On August 21, the DFVLR-PL tested the STM's ADP, and one day later the STM from Dornier was in-feeded as specified in the

contract. This WFC-input took place--just as EM-input did at the end of June 1985--once again before the date set in the AIT-plan.

Further activities during the report period:

Preparations for Phase 2 Safety Review by NASA

Further discussion on the WFC check-out sequence on the arm of the Shuttle and "go/no go" criteria (Issue 2 from August 28, 1985).

Routine interface discussion within the framework of the status meeting at DS from September 17 to 19.

Acceptance of all interface drawings including expenditure status in the "Configuration Status List (CSL)" (construction document catalog).

Outlook /26

The English project scientist announced alteration requests in the course of the AIT-program for the WFC-FM (Summer 1986), in order to gain more time to be able to calibrate the instrument better.

The DFVLR-PL is trying to supply the requested time. Chances are good that this will occur.

6.0 Assembly, Integration, and Test /27

QM-Telescope Integration

Following the vibration test conducted in the last report period, the telescope was inspected visually; the AKS was optically measured; the QM-thermal heat shield star sensor mass

model, and gyroscope mass model were integrated; the mirror system was tested optically, and the EM-FI was installed. The QM-telescope could be released on August 15, 1985, for Bus-integration after assembling thermal hardware and instrumentation for the Modal Survey Test and the solar simulation test.

Bus-Integration

Upon delivery of the DPS, which was completed late, pre-integration of the subsystems on the auxiliary structure could be continued and successfully concluded with tests from tape recorder 1, pyrotechnics, and electronic integration of the EM-WFC and the EM-FI.

The structure sent by MBB on July 5 was mounted in assembly scales in the clean room. Transfer of the EM-cable network and the subsystems to the central structure or else into the compartments took place promptly.

The QM-telescope and thermic hardware were then installed. Instrumentation for the modal survey and the solar simulation tests were carried out, and the STM-WFC of the solar generator central panel and the antenna layouts, the star sensors, magnet spools, the MM-battery, and the solar generator side panels were assembled. Mass models were built and assembled for missing AMCS-hardware.

Modal Survey Test

DS decided to have the Modal Survey Test of the S/C STM conducted by the IABG, but in the clean room at DS. A ten-day gain in time caused by scrapped transports and better environmental conditions supported this decision. The sterile room was prepared by placing strengthening elements at the foundation posts to support the 22-ton IABG test frame. The

test frame was cleaned, fastened in its ankerings, and subjected to an Eigen frequency test. The X/C was transferred from the horizontal trolley to the vertical trolley and turned to a vertical position. Then it was placed in the acceptance box of the IABG frame adapted for ROSAT. After constructing the activator frame and coupling the activator with the S/C, the test receivers were adhered (85 receivers with 250 measuring points). The pre-test review and the test release took place on September 9, the post-test review on September 27. Deviations from values measured and reviewed during the test amounted to approximately 8% compared to those derived analytically using the ROSAT calculating model. The test was successfully completed. The test report will be presented in two months, as agreed.

The cooperation of the companies involved, IABG, DS, /29 and MBB, was remarkably good, a fact which led to essentially friction-free test execution.

Solar Simulation Test

The period of time from January 7 to February 26, 1986, planned for ROSAT, remains unchanged.

The time period planned for use by TV-SAT from January 20 to February 26, 1986 was changed to February 5 to February 26, 1986. In addition, the test may be extended by eight days.

The two periods overlap by fourteen workdays.

On September 9, 1985, talks with all involved parties took place at the IABG. They discussed the interrelated effects each one of the involved projects would have on the others if it were given priority.

JPL, DS, and the DFVLR-PL met for talks at JPL in Pasadena on September 27, 1985. They discussed the use of test facilities located there. JPL will quote ROSAT a price by mid October.

RF Compatibility Test /30

The suitcase instrument set was prepared and delivered to JSC. The tests successfully proved the compatibility of the ROSAT telecommunication with the Shuttle.

7.0 Ground Equipment /31

7.1 EGSE and Checkout Software

Hardware and software were ordered to connect a data interface between the S/C-EGSE and the GSOC. The data interface for the GSOC was included in the specification "EGSE and Checkout Software." The specification was brought up to date (Version 3.2).

The available monitor tables were reworked. ETOL-test sequences were plotted for integration and checkout of the DHS, the WFC, and the FI. These sequences were brought up to date. Further service programs for AIT-support were calculated. The C/O test sequences were entered onto a list.

The AMCS-SCOE (special checkout equipment) was presented by DS, and interface tests were conducted with the S/C-EGSE.

7.2 MGSE

The vertical assembly frame was completed and has been in use since the Modal Survey Test. The telescope tracking frame is likewise already in use.

Preparation of test and operation regulations is being continued.

The contract was signed for completing the WSA-adapter to be used for the solar simulation test. The activities involving the MGSE will be extended by three months until December 1985 to allow for production of additional instruments.

7.3 Optical Ground Support Equipment (OGSE)

No projects.

8.0 Mission Safety /33

STS Safety (Flight and Ground Operation)

The integrated data packets for saftey inspection of Phase 2 were released by the project directors and forwarded to NASA-GSFC project directors for release to the inspection committee at NASA-JSC.

Upon conferring with NASA-JSC and -KCE, the NASA-GSFC directors confirmed the May 1985 date set for safety inspections of flight and ground operations.

Safety Inspection Dates:

Flight Operation: October 2-3, 1985
Ground Operation: October 10, 1985

Inspection by NASA-GSFC directors of the material lists included in revisions No. 4 has not been completed. Information for reference documents requested in the meantime was sent to NASA-GSFC in mid September 1985.

Dependability

Analysis of the FMECA and SPF lists for the subsystems by the DFVLR directors could not be completed yet since DS still has not delivered the system analysis.

Quality Control

During the report period, a total of 67 more disturbances and second stage MRB's involving EM and FM components of the satellite system have been checked and evaluated by the project directors.

On the occasion of the tenth status discussions on September 17, 1985 at DS, the status of all level 2 disturbances were checked in accordance with the DFVLR control list from September 12, 1985.

The result was that from a total of 111 second stage disturbance reports, 54 had been resolved, and 55 remained open. With regard to the open disturbance reports, it was requested of the contractor, that measures be introduced promptly to resolve the problems.

On June 6, 1985, an inspection was conducted at Teldix Co. in Heidelberg following final controls of eight FM-lots each involving eight types of double-sided PCB's (printed circuit boards) for the reaction wheels' control electronics. This acceptance test was necessary after Teldix had applied for an RfW (request for waiver) on a release of the production of double-sided PCB's for the ROSAT Project. Based on the quality test, all FM-lots for ROSAT were accepted.

During the sight test which was then conducted on a sampling of 2 PCB's per lot, a lot deficiency was discovered which would effect performance (excess soldering material caused parts to

stick). This deficiency was classified as critical with regard to subsequent piecing.

For this reason, this lot and successive lots having the same design were not released for use. /35

It was agreed, that Teldix should present corrected PCB's for another inspection after taking necessary measures to eliminate the deficiency.

Central Construction Part Acquisition

During the report period, two discussions took place (on July 29 - 30, 1985 at the agency, and on September 9, 1985 within the framework of the tenth status talks at DS) regarding the status of construction part acquisition.

Accordingly, the following status may be reported at the end of this quarter:

After analyzing the agency's "delay" list 15A, dated September 9, 1985, the contractor and the DFVLR directors made a list with a total of 39 "line items" (LI's). A number of these items have substantial delivery delays, and for a number of them no alternative accelerated delivery can be provided.

It was agreed, that the agency and DS would promptly clarify the outstanding delivery dates (between KW 43/85 to KW 9/86) with the involved parties regarding problems with dates for the production of FM-components.

The delivery situation of two radiation hard RCA CMOS-blocks has not changed. Anticipated delivery date for the industrial types is mid October 1985, and the beginning of December 1985 for the HIREL types.

Tests on 20 "upgrading" construction parts which are /36 being conducted at present at the EPI could not be completed in the report period.

As mentioned already in last quarter's report, the project directors prepared two acquisition status lists for internal use. These are based on the entire acquisitions list and "delay" list 14A made by the agency on July 27, 1985 and are to serve the project directors as an instrument with which to better judge the delivery situation for FM-components.

9.0 Launch Vehicle Interface /37

ICD-A-18410

NASA-JSC presented a so-called "preliminary version" of DFVLR/DS commentary on the temporary "Draft Version" (from February 15, 1985) of the ICD. This preliminary version is to be discussed within the framework of a NASA interface discussion to be held at the beginning of October 1985 at NASA-JSC. The aim of this discussion is to prepare a "baseline version" of the ICD which can be signed into effect.

On the basis of the edited document TN-2002-2180 DS/017, 2nd edition dated July 9, 1985, in which the electric interfaces (hardlines) of the ROSAT to the OIB are defined, the "design review" (DR) of the OIB was conducted on September 30, 1985 at NASA-JSC. The second part of this review will take place in the first week of October, also at NASA-JSC.

A summary of results or else decisions on the DR will appear in the next report.

PIP-Annex

Preparations were completed for discussions on the PIP-A8

(launch site support plan draft from June 1985) and the PRD with NASA-KSC on October 9 and 11, 1985 at NASA-KSC.

Suitcase Test at NASA-JSC

The so-called suitcase test (compatibility test of the ROSAT-RF system with the STS) was conducted successfully at NASA-JSC from September 24 - 30.

The corresponding compatibility test ("Van-Test") of /38
the ROSAT RF-system with the NASA ground stations will be conducted on October 1 - 3 using the NASA-GSFC test instrument ("Van"), also at NASA-JSC.

"Contingency EVA"

The concept for the problem configuration of a "contingency EVA" was prepared by agreement with the contractor. Plans are being made to present and discuss this concept on October 7, 1985 at a special work discussion with NASA-JSC experts.

10.0 Mission Operation /39

Basically, projects ran according to schedule. A number of projects could not be carried out as planned due to insufficient information or delayed experiment operation requirements (EORD). This compensated partially for a lack of manpower.

Coordination

Regular meetings between GSOC and the chief contractor, Dornier System (DS), were set to improve agreement on mission operation preparations with the satellite producer.

Flight Operation

A preliminary, not entirely finished outline of the completed "Experiment Operations Requirements Document (EORD)" is available and is being discussed with MPE. A baseline version of the EORD cannot be expected before the beginning of November 1985. The keypoint here lies in prepartion of telemetry and commando information needed to establish data banks at the GSOC. For the same reason, it is necessary to hold talks with DS regarding the operation manual.

Ground Operation

The ROSAT project requirement document (GSOC-PRD) has been presented in outline form. The preparatory projects for the NASA-SIRD are not yet completed. Agreement on the "remote POCC interface" (PIP-Annex 5) between NASA-JSC and GSOC has been reached except for several inquiries regarding the last DFVLR-NASA talks.

Precision investigations on ground station computer time allotment have not been completed. /40

Investigations are under way on the possibility of including the Australian ground station "Alice Springs."

Mission Planning and Analysis

Definition of mission planning system (MPSS) requirements progresses haltingly. "Beta"-angle and shadow time calculations beyond the nominal ROSAT mission in high dissolution were conducted to support ROSAT thermal analysis.

Post-facto site determination software was developed further. In order to continue this development, information from the ROSAT project was needed, which is not yet available

(for example, converstion of AKS telemetry datainto telescope axes direction values).

Projects in the division of "site control" depend on availability of the star catalog software from the ROSAT project. Availability dates for star catalog software packets, set in an earlier schedule (status DRI) for July 1985, will occur later in accordance with the project schedule which is now valid (as of May 7, 1985).

Data System

Data interface specifications between GSOC and the ROSAT FM-satellite during the IST-phase were completed. The off-line computer capacity at WT-DV for support of GSOC requirements (ROSAT and other projects) was analyzed. Temporary /41 results are available.

AMCS Simulator

Bid requirements for preparing software for servicing interfaces from the AMCD-simulator hardware and the simulation computer were announced by GSOC to DS.

Development of the simulator system software was started.

A basis version is available in releasable form and was delivered to RAL for interface tests between sensor simulation software and the system software. RAL has problems getting access to suitable computer systems.

The design of the "dynamics and sensor simulation software" continues according to plan.

Test and Training

No activities to report.

Software

No activities to report.

11.0 Schedule /42

Planned Dates

The currently valid DS schedule dated May 7, 1985 quotes October 30, 1987 as the takeoff date. This corresponds to the contract's milestone plan.

The NASA schedule in the PIP planned September 30, 1987 as the takeoff date (reference milestone: "ready for launch"). Taking into consideration the 4-week buffer before transport of the flight unit to the launch pad, this date will be kept.

Actual EM-Status

In view of the valid schedule, the EM-integration is on schedule.

Actual FM-Status

Preparation of the flight mirror system in the C/D contract (milestone M7) is delayed. The extent of the delay and its effect on the rest of the milestones (M8-M11) must be determined. The FM-integration course is being revaluated for this and other reasons.

DFVLR

Deutsche Forschungs-und Versuchsanstalt fur Luft-und Raumfahrt eV

- BEREICH FUR PROJEKTTRAGERSCHAFTEN -

Release.

Processing

MILESTONE PLAN

ROSAT EM, QM, STM, ENTW, PRODUCTION, S/S-TESTS, AIT

PROJECT DIRECTORS

PAGE OF

STAGE

ORIGINALPLAN DR I

FROM

LAST CHANGE

SAMPLING DATE 30 9 85

	MILESTONE AND ACTIVITIES
1	SPACECRAFT DESIGN
2	M2 DESIGN REVIEW I
3	SUBSYSTEM (SIS) DEVELOPMENT
4	PRODUCTION, EM, QM
5	S/S TESTS EM, QM
6	AIT TELESCOPE QM
7	EM-DELIVERY/MA (M3) FI, WFC
8	AIT BUS EM
9	ROSAT INTEGRATION
10	M4, ROSAT READY I MODAL SURV TEST
11	MODAL SURVEY TEST
12	RF SUIT CASE TESTS JSC (J), GSOC (G)
13	PRE IST, IST
14	EMC TEST
15	SOLAR SIM TEST
16	M5, DESIGN REVIEW 2
17	M6, DISSASEMBLE SPACECRAFT
18	DISSASSEMBLE STM
19	STRUCTURE OVERHAUL

1983 1984 1985 1986 1987

J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D

MA WFC FI

NOTES ..... ORI PLANNING STATUS —— PLAN STATUS 7 5 85 ■■■■ IST STATUS

ORIGINAL PAGE IS OF POOR QUALITY

DFVLR

Deutsche Forschungs-und Versuchsanstalt fur Luft-und Raumfahrt eV

- BEREICH FUR PROJEKTTRAGERSCHAFTEN -

Release

Processing

MILESTONE PLAN

ROSAT EM, QM, STM, ENTW, PRODUCTION, S/S-TESTS, AIT,

PROJECT DIRECTORS

STAGE

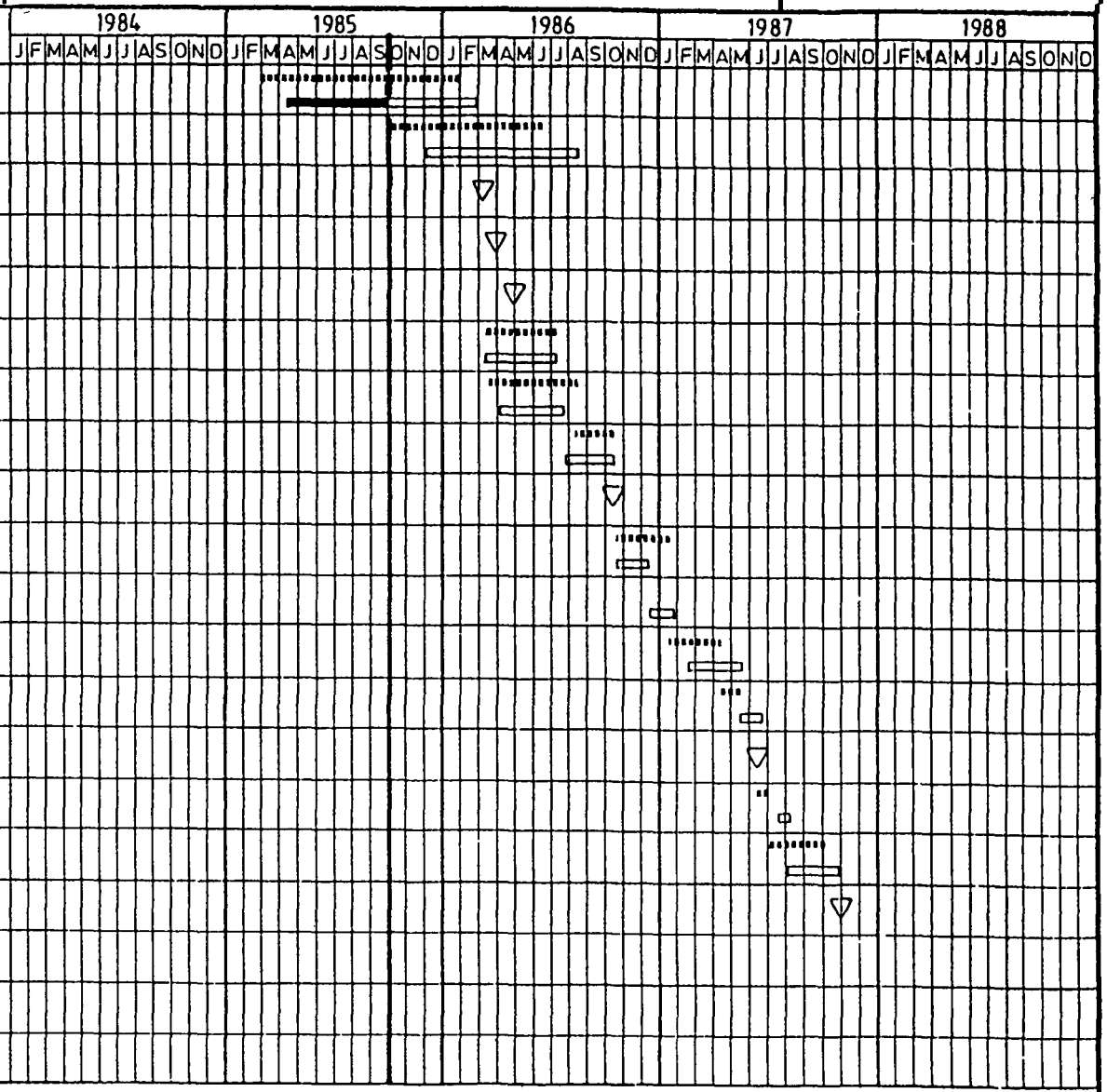
PAGE OF

ORIGINALPLAN DR I
FROM

LAST CHANGE

SAMPLING DATE 30 9 85

	MILESTONE AND ACTIVITIES	
1	PRODUCTION	FM
2	S/S TESTS	FM
3	M7 DELIVERY	MA
4	DELIVERY	FI
5	DELIVERY	WFC
6	AIT TELESCOPE	FM
7	AIT BUS	FM
8	ROSAT INTEGRATION	FM
9	M8 ROSAT FM READY FOR ENVIRONMENT TESTS	
10	EMC-, TV-, ACOUSTIC NOISE TEST	
11	COMPATIBILITY TEST GSOC	
12	TELESCOPE X-RAY PERFORMANCE TEST	
13	FINAL IST	
14	M9 PRESHIPPING REVIEW	
15	TRANSPORT TO KSC	
16	KSC LAUNCH PREPARATION	
17	M10 START	



NOTES ..... DR I PLANNING STATUS — PLAN STATUS 7 5 85 ▬ IST STATUS

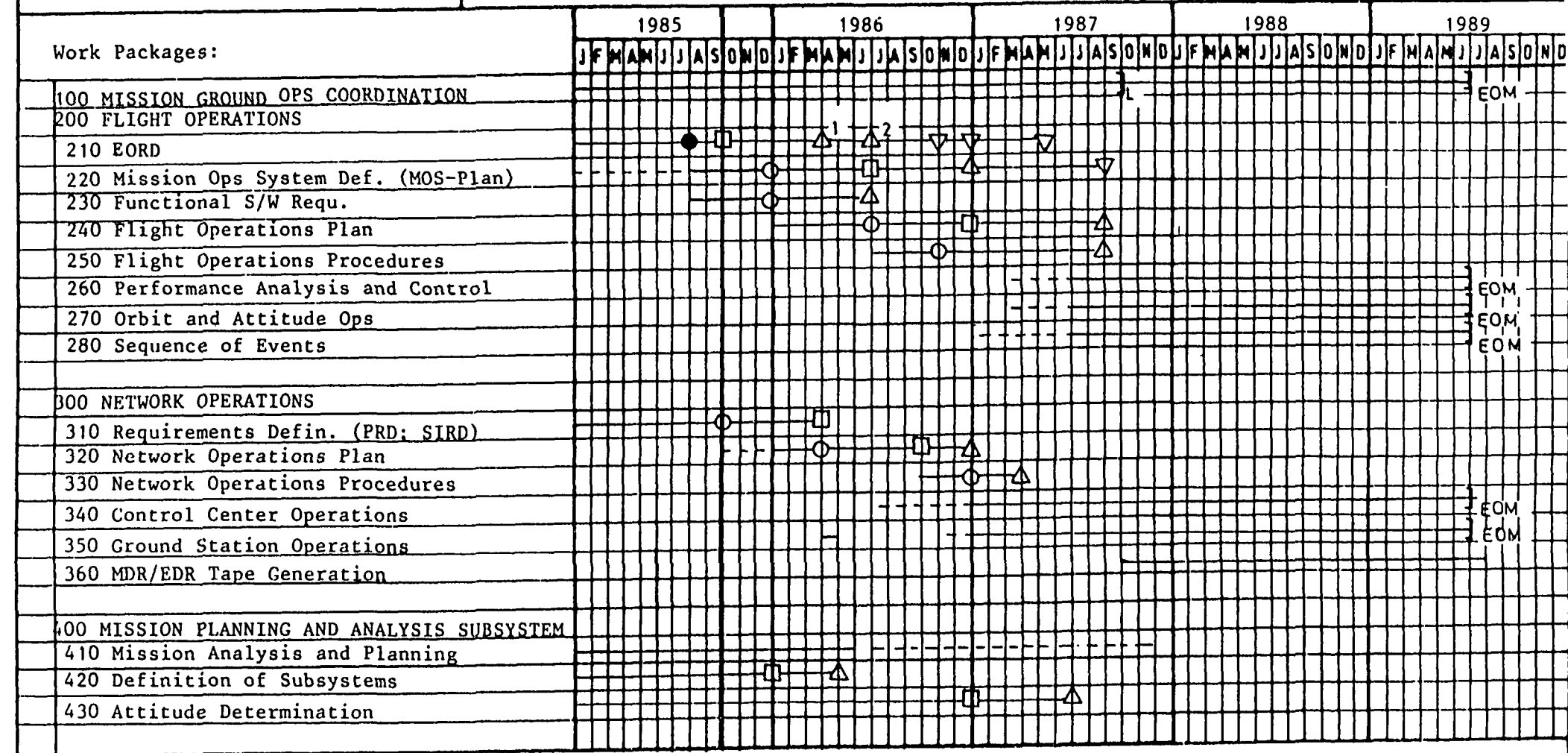
ORIGINAL PAGE IS OF POOR QUALITY

ORIGINAL PAGE IS
OF POOR QUALITY

prepared: T. Gerkenhoff
Mission Ground Ops Mgr.

ROSAT
MISSION GROUND OPERATIONS
GSOC/DFVLR

Original Schedule: July, 16. 1984
Last Schedule Change: June, 18. 1985
Status as of: 1. October 1985



○ PRELIMINARY
□ BASELINE
△ FINAL
▽ UPDATE
] MARK-EVENT

1) TLM+CMD Requirements
2) OPS+ATTITUDE Requirements

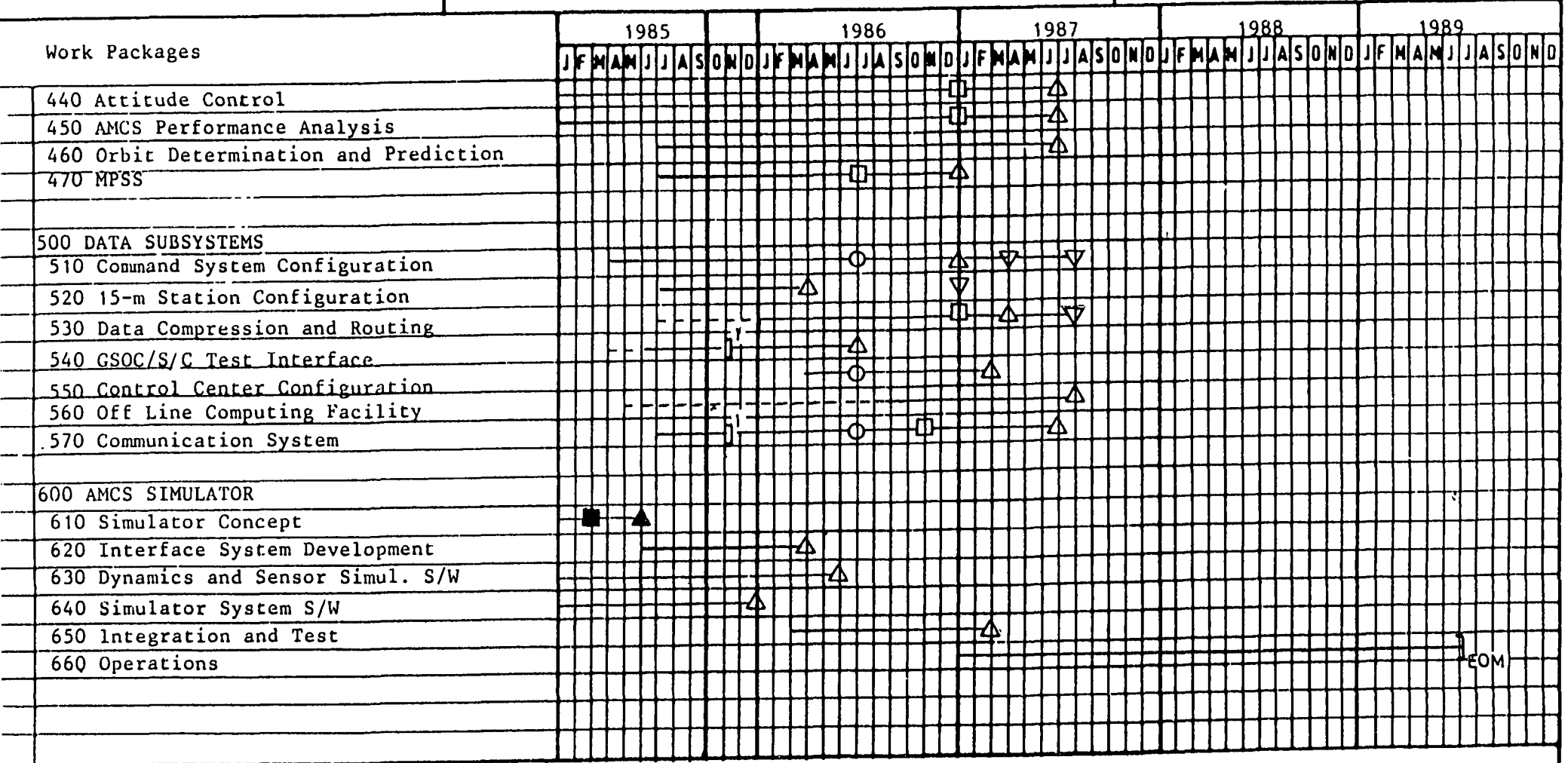
L = Launch
EOM = End of Mission

ORIGINAL PAGE IS
OF POOR QUALITY

prepared: [signature]
Mission Ground Ops Mgr.

ROSAT
MISSION GROUND OPERATIONS
GSOC/DFVLR

Original Schedule: July, 16. 1984
Last Schedule Change: June, 18. 1985
Status as of: 1.October 1985



1) DOSY-EGSE/GSOC Data I/F implemented and tested

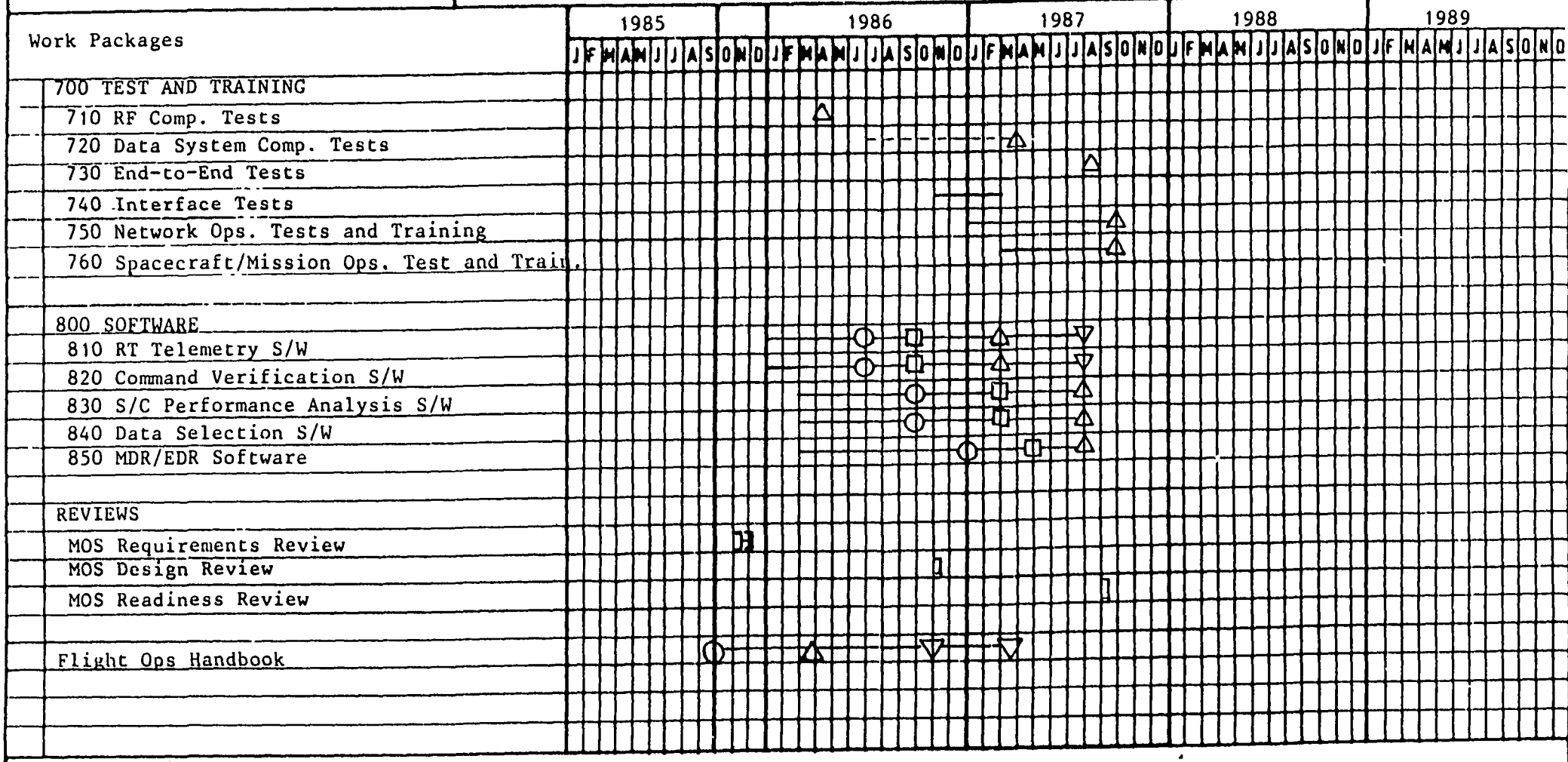
○ PRELIMINARY
□ BASELINE
△ FINAL
▽ UPDATE
] MARK-EVENT

ORIGINAL PAGE IS
OF POOR QUALITY

prepared: T. Lukenbill
Mission Ground Ops Mgr.

ROSAT
MISSION GROUND OPERATIONS
GSOC/DFVLR

Original Schedule: July, 16. 1984
Last Schedule Change: June, 18. 1985
Status as of: 1. October 1985



○ PRELIMINARY
□ BASELINE
△ FINAL
▽ UPDATE
] MARK-EVENT

13.0 APPENDIX /62

13.1 Personnel utilization for DFVLR-PT and DFVLR-WT

ORIGINAL PAGE IS
OF POOR QUALITY

ROENTGEN SATELLIT

Personnel utilization for DFVLR-PT

(Man-months)

STATUS 30.09.95

	Period	Ideal	Actual	Period	Ideal	Actual	Period	Ideal	Actual	Period	Ideal	Actual
Category I	12/84	13.0	8.2	1/85	13.5	8.1	2/85	13.5	8.6	3/85	13.5	9.1
Category II		3.5	0.9		3.5	1.0		3.5	1.0		3.5	1.0
Category III		4.0	4.1		4.0	3.5		4.0	3.1		4.0	3.4
Total		20.5	13.2		21.0	12.2		21.0	12.7		21.0	13.5
Category I	4/85	13.5	9.3	5/85	13.5	9.6	6/85	13.5	10.8	7/85	13.5	10.2
Category II		3.5	1.1		3.5	1.1		3.5	1.1		3.5	1.0
Category III		4.0	3.9		4.0	3.9		4.0	3.7		4.0	3.7
Total		21.0	14.3		21.0	14.6		21.0	15.6		21.0	15.2
Category I	8/85	13.5	12.1	9/85	13.0	12.7						
Category II		3.5	0.9		3.0	1.1						
Category III		4.0	3.1		4.0	3.0						
Total		21.0	16.1		20.0	16.8						

Personnel Utilization for DEVLR-WT

(Man-months)

STATUS

	Period	Ideal	Actual	Period	Ideal	Actual	Period	Ideal	Actual	Period	Ideal	Actual
Category I	1/85	6.0		2/85	6.0		3/85	6.0		4/85	6.0	5.4
Category II		6.0			6.0			6.0			6.0	2.8
Category III		1.0			1.0			1.0			1.0	0.2
Total		13.0	5.6		13.0	7.6		13.0	8.1		13.0	8.4
Contractorsen		10.5	6.1*		10.5	6.1*		10.5	6.1*		10.5	6.1*
Category I	5/85	6.0	6.3	6/85	6.0	6.1	7/85	6.0	5.4	8/85	6.0	4.9
Category II		6.0	3.1		6.0	2.9		6.0	2.4		6.0	2.4
Category III		1.0	0.2		1.0	0.2		1.0	0.3		1.0	0.3
Total		13.0	9.6		13.0	9.2		13.0	8.1		13.0	7.6
Contractors		10.5	6.1*		10.5	6.1*		10.5	10.0		10.5	11.0
Category I	9/85	6.0	5.9									
Category II		6.0	2.4									
Category III		1.0	0.3									
Total		13.0	8.6									
Contractors		10.5	11.0									

*Average for first half of ye

ORIGINAL PAGE IS
OF POOR QUALITY

13.2 Key to Abbreviations

ABM	Antenna Boom Mechanism
ADP	Acceptance Data Package
AKS	Ausricht-Kontroll-System
AIT	Assembly, Integration and Test
AMCD	Attitude Measurement and Control Data Unit
AMCE	Attitude Measurement and Control Interface Electronics
AMCS	Attitude Measurement and Control Subsystem
BAT	Battery
BCU	Battery Control Unit
Bit. Sync.	Bit Synchronizer (Synchronization)
BMFT	Bundesminister für Forschung und Technologie
CCD	Charge Coupled Device
CCL	Charge Current Limiter
C&DH	Command and Data Handling
CEL	Control Electronics
CFK	Carbon Fiber Reinforced Plastics
CFRP	Carbon Fiber Reinforced Plastics
CITE	Cargo Integration Test Equipment
Cmd	Command
CMOS	Complementary Metaloxyde Silicon
C/O	Checkout
CPP	Central Parts Procurement
CPU	Central Processing Unit
CSA	Charge Solar Array
CSS	Coarse Sun Sensor
CZ	Firma Carl Zeiss

DC	Direct Current
DEC	Decoder
DFVLR	Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt
DFVLR-PL	DFVLR-Projektleitung
DHS	Data Handling Subsystem
DMA	Direct Memory Access (Direct Assess to Memory)
DMOD	Demodulator
DNEL	Disconnection of Non-Essential Loads
DPS	Data Processing System
DS	Dornier System
ECS	Environmental Control System
EED	Electro-Explosive Device
EEL	Experiment-Electronics
EGSE	Electrical Ground Support Equipment
EM	Engineering Model
EMC	Electromagnetic Compatibility
EOL	End-of-Life
EORD	Experiment Operations Requirements Document
EPD	External Power Dumper
ESA	European Space Agency
ETOL	ESA Test Operation Language
EUV	Extreme Ultraviolet
FEM	Finite Element Model
FI	Focal Plane Instrumentation
FLS	Fiducial Light System
FM	Flight Model
FMECA	Failure Mode Criticallity Analysis
FWHM	Full Width at Half Maximum

GF	Grapple Fixture
GSE	Ground Support Equipment
GSFC	Goddard Space Flight Center
GSOC	German Space Operations Center
GVS	Gas Supply System
GYP	Gyropackage
GYPE	Gyropackage Electronics
GYPS	Gyropackage Sensor
HC	Heater Control
HEAO-2	High Energy Astronomy Observatory ("Einstein")
HIREL	High Reliability
HK	Housekeeping
HP	High Power
HRI	High Resolution Imager
ICD	Interface Control Document
INVAR	(Special steel alloying trademark)
IST	Integrated System Test
JSC	Johnson Space Center
kbps	Kilobit per second (deutsch: kbit/s)
KSC	Kennedy Space Center
KW	Kalenderwoche
LCL	Latching Current Limiter
LED	Light Emitting Diode
LHC	Left-hand Circulation
LI	Line Item
LP	Low Power

MA	Mirror Assembly
MAC	Mirror Attachment Cone
Mbps	Megabit per second (deutsch: Megabit/s)
MC	Magnetic Coil
MCC	Mission Control Center
MCP	Microchannel Plate
MDM	Multiplexer/Demultiplexer
MED	Magnetic Electron Deflector
MES	Mechanisms Subsystem
MGSE	Mechanical Ground Support Equipment
MIP	Mandatory Inspection Point
MLI	Multilayer Insulation
MM	Magnetometer
MM	Massenmodell
MOU	Memorandum of Understanding
MPE	Max-Planck-Institut für Physik und Astrophysik, Institut für Extraterrestrische Physik
MPG	Max-Planck-Gesellschaft
MPSS	Mission Planning and Scheduling System
MRB	Material Review Board
MSA	Main Solar Array
MSSL	Mullard Space Science Laboratory
MUC	Multi-Use Container
MUDAS	Modular Universal Data Acquisition and Control System
MVL	Main Voltage Limiter
NASA	National Aeronautics and Space Administration
NCR	Non Conformance Report
NRZ/L-Code	Non-Return-to-Zero/L-Code
NSI	NASA Standard Initiator

OBC	Onboard Computer
OGSE	Optical Ground Support Equipment
OIB	Orbiter Interface Box
OSR	Optical Surface Reflector
PCB	Printed Circuit Board
PCU	Power Control Unit
PDU	Power Distribution Unit
PETS	Payload Environmental Transportation System
PGHM	Payload Ground Handling Mechanism
PHP	Paraboloid-Hyperboloid Pair
PIP	Payload Integration Plan
POCC	Payload Operations Control Center
PPF	Payload Processing Facility
PRD	Program Requirements Document
PSE	Payload Support Equipment
PSK	Phase-shift Keying
PSPC	Position Sensitive Proportional Counter
PSS	Power Supply Subsystem
PYB	Pyrotechnics Electronic Box
QM	Qualification Model
RAL	Rutherford Appleton Laboratory
RE	Radiated Emission
RF	Radio Frequency
RfW	Request for Waiver
RMC	Right-hand Circulation
RMS	Remote Manipulator System
ROSAT	Röntgensatellit
RS	Radiated Susceptibility

RSGF	Rigidized Sensing Grapple Fixture
RSS	Rotating Service Structure
RT	Real Time
RW	Reaction Wheel
RX	Receiver
S/C	Spacecraft
SCOE	Special Checkout Equipment
SERC	Science & Engineering Research Council
SEU	Single Event Upset
SIRD	Support Interface Requirements Document
S/L	Serial Load
SOC	Science Operations Center
SOS	Silicon on Sapphire
SPF	Single Point Failure
SPL Code	Split Phase Level Code
SSM	Single Surface Mirror
SSM	Separation Switch Mechanism
ST	Star Tracker
STC	Star Tracker Camera
STE	Star Tracker Electronics
STM	Structural Thermal Model
STS	Space Transportation System
SURS	Shuttle Umbilical Retraction System
TA	Technical Instructions
TC	Telecommand
T/C	Thermal Control
TCE	Thermal Conditioning Equipment
TCS	Telecommunication Subsystem
TDM	Telescope Door Mechanism

TM	Telemetry
TR	Tape Recorder
TT & C	Telemetry, Tracking and Command
TV	Thermal-Vakuum
TX	Transmitter
US	Subsystem
VPHD	Vertical Payload Handling Device
VPF	Vertical Processing Facility
WDE	Wheel Drive Electronics
WFC	Wide Field Camera
WFCC	WFC-Consortium
WSA	Weltraumsimulationsanlage
XRT	X-Ray Telescope
ZERODUR	(Trademark for the glass-ceramic-substance for the mirror)
ZDE	Central Data Electronics